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PREVALENCE OF SEXUALLY TRANSMITTED INFECTIONS IN WOMEN ATTENDING GYNAECOLOGICAL CLINICS

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قال الله تعالى :

{وقل ربي زدني علماً}.

صدق الله العظيم

Dedication

To

My mother, father, brothers and sisters

To my wife Sara .....

ACKNOWLEDGEMENT

My great thanks and gratitude to **Prof. Adel Salam Gerais**, Department of Obstetric and Gynaecology, University of Khartoum for his kind help, guidance and patience. His valuable advice, comments and criticism are highly appreciated.

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I would like also to thank my wife **Sara**, because without her help and encouragement, this work would have never been completed.

Abbreviations

Abbreviation	Meaning
AIDS	Acquired Immuno-deficiency Syndrome
ANC	Antenatal Care
STI	Sexually Transmitted Infections
WHO	World Health Organization
OTH	Omdurman Teaching Hospital
PCH	Police Central Hospital
RPR	Rapid Plasma Reagin
TPHA	Treponema Pallidum Haemoagglutination
HVS	High vaginal swab
NS	Not significant
HIV	Human immuno-deficiency virus
GTT	Germ Tube Test
UNDP	United Nations Development Programme
LGV	Lymph granuloma venereum
PID	Pelvic inflammatory disease
PCK	Polymerase Chain Reaction
VDRL	Venereal Disease Research Laboratories
ELISA	Enzyme Linked Immunosorbent assays

ABSTRACT

This is cross-sectional study conducted at Police Central Hospital and Omdurman Teaching Hospital, Gynaecological Clinics, between Aug.1999 to Feb. 2000 to determine the prevalence of common STI and candida. It involved 110 patients attending these clinics.

The study was conducted by direct interview, medical examinations and laboratory investigations.

High STI prevalence was detected (38.2%) while the prevalence of more than one STI is 4.5%.

The most prevalent organism was *Candida albicans* (19.1%), followed by *Chlamydia trachomatis* (9.1%), *Trichomoniasis* (6.4%), confirmed syphilis (5.4%), gonococcal infection (1.8%) and HIV (1.8%).

Neither vaginal discharge nor its colour is found to be sensitive or specific for the diagnosis of STI.

The presence of genital ulcer, copious vaginal discharge and occupation of the husband are not good predictors for STIs.

Recommendations are to assess all patients with vaginal discharge for STI, to adopt a national strategy for prevention of STI/HIV and early treatment of STI were suggested.

This study is the other arm of another study done by Dr. Ortashi who investigated the prevalence of STI in pregnant women attending the antenatal care clinics during the same period of time.

ملخص الأطروحة

هذه دراسة مقطعية تمت في عيادة أمراض النساء بمستشفى الـشرطة المركـزي، ومستشفى أم درمان التعليمي في الفترة من أغسطس **1999** وحتى فبرايـر **2000** لتحديـد أسباب ونسبة الأمراض المنقولة جنسياً بين المترددات على هـاتين العيـادتين. وقـد شـملت الدراسة **110** امرأة.

تمت الدراسة بمقابلة مباشرة للسيدات وملء استبيان ثم عمل كشف طبي مصحوب بالفحوصات المعملية. وجد أن هنالك نسبة عالية من النساء يحملن أحد هذه الأمراض المنقولة جنسياً **38.2**%.

اكثر أمراض الالتهابات المنقولة جنسياً كان فطر المبيضات **19.1**% يليه ميكروب المتدثرة **1.9**% ثم طفيل المشعرة المهبلية **6.4**% ثم الزهـري **5.4**% فالـسيلان **1.8**% ومرض عوز المناعة المكتسبة **1.8**%.

لم توجد علاقة تشخيصه بين إفراز المهبل ولا لون الإفراز مع الأمراض المنقولـة جنسياً. كما لم نجد أى مؤشرات إيجابية الدلالة بين مهنة الزوج ووجود أى أمـراض منقولـة جنسياً.

تمثلت التوصيات المقترحة في عمل فحوصات لجميع المريضات اللائى يـشتكين من إفرازات مهبلية حتى يتم الوصول للسبب، كما دعت التوصيات إلى تبنى سياسـة قوميـة للمكافحة والعلاج المبكر لجميع الأمراض المنقولة جنسياً.

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INTRODUCTION

Sexually transmitted diseases have been a much-neglected area in public health in most of the developing world, despite overwhelming evidence of their impact on health particularly of women in the reproductive age.

Historically data from medical texts revealed the existence of gonorrhea and chancre in Japan during the 15th century.

A subsequent increase in the number of STI infected individuals was noted during World War II. This historical perspective evaluation gives us a clue to the relation between STI prevalence and the influence of social, economic, political and cultural factor.[1] The emergence of AIDS in the 1980s has highlighted the importance of sexual transmission in the spread of infection and the lack of control programs for STI.

Social, economic and political disruptions often involve sudden migration of population and increased sex workers. Therefore, Africa is the worst affected by AIDS especially the countries, which surround the Sudan. In fact infection rates are reaching alarming new highs in many of these countries.

Therefore assessment of the prevalence of HIV /STI remains an important public health priority.

LITERATURE REVIEW

STI infect the reproductive tract as their primary site, with transmission occurring during sexual intercourse or from mother to child during pregnancy and child birth.

On the other-hand the spread of HIV may be due to blood transfusion, injections of therapeutic purposes, drug abuse and infection with other STI which may serve as co-factors for HIV transmission.

More than thirty bacterial, viral and parasitic diseases have now been identified that can be transmitted sexually. There are estimated 250million new cases of STI annually. (2)

In sub-Saharan Africa HIV and AIDS continue to have devastating impact where they account for 108 million deaths in 1998.(3)

Estimates of the impact show that HIV/AIDS will have a significant effect on future population size and age structure. Moreover, this may lead to a decrease in labor force participation rate. A major concern is the loss of skilled personnel. With two-thirds of all the people worldwide who are infected with HIV, Africa remains the most seriously affected region; 70.4% of adults in Africa are infected with HIV.(4)

The transmission of HIV through heterosexual and homosexual intercourse accounts for about 86% of all HIV/AIDS cases worldwide.[5]

The WHO estimates, although based on comprehensive survey of the available information, are limited by the quantity and quality of the prevalence data available from different regions and our knowledge of the duration of the infection. A wide spread difference between regions in the incidence of AIDS has been associated with socioeconomic and cultural differences. [6]

Data from epidemiological surveys show that within a country and between countries in the same region, the prevalence and incidence of STI may vary widely even in similar population groups. In some parts of the world with high prevalence countries, prevalence rates in the population at risk “15-49 year olds” are up to 2%; while low prevalence countries have rates of < 0.1 %.[7]

By 1996, an estimated 1.7% million Ethiopians were HIV infected, HIV prevalence is projected to reach 6% by 2004. [8]

In 1993 World Development Report estimates suggested that in demographically developing countries STI “excluding HIV” account for 8.9% of the disease burden in women age 15-45 years and 1.5% in men in the same age group. This ranked STI “excluding

HIV" as the second major cause of lost disability-adjusted life years in women of reproductive age.[9]

Even in the developed countries, the prevalence of HIV is still high. HIV infection was the 7th leading cause of death among people aged 15-24yrs in the US during 1997.[10]

The disease burden from STI is a result of complications and sequel that may follow infection, e.g. primary infection with gonorrhea and chlamydia in woman is usually symptom-less when left untreated. However, infection may migrate upwards from the lower reproductive tract and leads to pelvic inflammatory disease (PID), chronic pelvic pain, tubo-ovarian abscesses, ectopic pregnancies and infertility. In addition, untreated infection in pregnant women may result in fetal loss, still birth, low birth weight and eye and lung damage in the newborn.

According to the results of study done in Zimbabwe, about 28% of infants of HIV- positive mothers are infected in utero (20% during labour) and an additional 14% are infected by breast feeding.[11]

The African Journal of Reproductive Heath reported that 20-30% of couples in Africa had considerable primary and secondary infertility. The increased incidence of infertility in Africa is evidently

due to high prevalence of classic (STI) complications connected with unsafe abortions and postpartum infections.[12]

According to the Family Planning Perspectives Journal, HIV infected women have a higher incidence and prevalence rate of gynecological disorders compared with the uninfected women. [13]

The HIV/AIDS epidemic in sub-Saharan Africa is spread mainly through heterosexual intercourse. In fact the prevalence of HIV-1 infection is thus higher among women undergoing induced abortions than among those who deliver and higher among women who refuse testing than among those who consent. [14]

Worldwide, HIV studies estimated that over 47 millions people have been infected of whom 14 million have died. [15] In Sudan, few studies investigated the prevalence of STI . A study published in the AIDS Analysis African Journal estimated HIV prevalence in Sudan to be 0.6%. It reported 150000 infected patient.[16]

UNDP News Journal had a special report on STI project for North and South Sudan. It declares that HIV transmission has increased due to a high concentration of military personnel and population displacement. It suggests that the south have the highest HIV prevalence and 46% of known AIDS cases. STI increased from 2.3% in 1989 to 14.1%in 1994. [17]

Ortashi, who conducted the other arm of this study on 151 pregnant ladies, non of them was HIV positive, found the most prevalent organism was *Chlamydia trichomatis* 19.9%, followed by *Candida* 13.9%, *Trichomonas vaginalis* 7.3%, confirmed syphilis 2.6% and *N. gonorrhea* 2.0 %.[18]

Elhaj and ELNaeim in 1996 studied 200 non pregnant ladies, they found *Chlamydia* to be prevalent in only 2.3%, *Trichomonas vaginalis* in 3.2% and *N. gonorrhea* in 0.6 %.[19]

Omer in 1977[20] studied 400 non-pregnant females with vaginal discharge; he found *Candida albican* prevalent in 25.4% of those with vaginal discharge. In another study carried out by Elnaeim and Omer in 1994[21] they found evidence of trichomoniasis in 17.4% of patients with vaginal discharge.

Aetiology:

The conditions, which are considered in this study, include gonorrhea, chlamydial infection, *Trichomonas vaginalis*, *Candida, syphlilis*, and HIV. Other conditions, which may be transmitted by sexual contact, include genital warts, herpes genitals, chancroid and hepatitis A and B.

Gonorrhea:

This is caused by infection with *Neisseria gonorrhea,* which infects only human beings. It is a Gram negative dipplococci. It is

often intracellular. Gonorrhea remains a common cause of morbidity in women and neonates worldwide. The organism is highly infectious and is transmissible prior to the onset of symptoms. Gonorrhea has a short incubation period usually 2-5 days. Asymptomatic infections are common in women especially during pregnancy and also occur in men. This results in late presentation with complications, and facilitates disease transmission. A site for local complications includes skenitis and bartholinitis. Pelvic inflammatory diseases occur in about 15% of infected women. Distant complications consist of perihepatitis and septicaemia. Gonorrhea may be associated with early abortion, intrauterine growth restriction and postpartum infection.

Also it is implicated in the aetiology of infertility and ectopic pregnancy. In men it can cause urethritis, epididymitis, prostatitis and disseminated infection. Gonococcal ophthalmia neonatorum is a recognized complication.

Chlamydia trachomatis:

This is an unusual Gram-negative bacterium, which behaves like a virus in that it replicates intra-cellularly. It is responsible for at least half of all cases of non-specific genital infection, which includes non-specific urethritis in the males and related conditions in the females. It is an exclusively human pathogen which consists of sero-

viruses most of which are associated with infections like trachoma, genital tract infections, conjunctivitis, infant pneumonia and lymph granuloma venereum (LGV).

Chlamydia also causes urethral syndrome in young women, cervicitis, PID, perihepatitis and acute appendicitis. Late sequel of PID is infertility and ectopic pregnancy.

Chlamydia is also a common cause of neonatal disasters. A congenital infection accompanied by nasopharyngeal infection may later progress to a febrile pneumonitis and otitis media.

Chlamydia can be demonstrated in cell culture for which a special transport medium and prompt delivery to the laboratory are necessary. Detection of chlamydial DNA using nucleic acid hybridization and polymerase chain reaction (PCR) is very sensitive but is at present unsuitable for routine diagnosis

Trichomoniasis:

This is caused by infection with the protozoon *Trichomonas vaginalis*, which is actively motile by virtue of its four unipolar flagellae. The condition is usually sexually transmitted. Although non-sexual transmission is theoretically possible, it is likely to be an exceptional means of acquisition. Trichomoniasis is frequently associated with other STI.

T. vaginalis is an ovoid, globular pear-shaped, flagellate, 12-25 µm long. It adheres to mucous membranes. Squamous epithelial cells are involved. The conditions are typically presented with foul-smelling mucopurulent vaginal discharge. The discharge may be frothy grey to green yellow one. Accompanying symptoms of dysuria and vulval soreness may be present.

The diagnosis is proved by the microscopic identification of the causative protozoa in a wet film. It can also readily be seen in cervical smear. Swabs sent in a transport media can also be cultured.

Syphilis:

Syphilis is one of four human treponemal diseases whose causative organisms are morphologically indistinguishable and which cannot be differentiated by the results of serological tests. Syphilis is a chronic systemic disorder caused by infection with *Treponema pallidum*. The other non- venereal treponematoses are yaws, pinta and endemic syphilis. Only their epidemiology, clinical manifestations and mode of transmission can differentiate them.

T. pallidum is transmitted through direct contact with an infectious lesion of the mucous membranes or abraded skin. After an incubation period of 9-90 days the multiplication of the spirochetes gives rise to the primary chancre, which is a raised

round indurate painless ulcer. It is usually single, sited on the external genitalia and accompanied by bilateral non-tender rubbery inguinal lymphadenopathy.

Treponema is detectable in specimen from these lesions using dark field or fluorescence microscopy. Serum antibodies can be detected 1-4 weeks after the chancre has formed. The untreated lesion will heal spontaneously within 3-8 weeks, which is usually followed by asymptomatic period of 6 weeks to 6 months. Secondary lesions occur in different organs and tissues of the body. These lesions are microscopically positive and all serological tests are reactive, secondary lesions heal spontaneously over a period of two months. An asymptomatic or latent period then follows. It can last for years, even a lifetime.

The untreated patient may have persistent latent infection or may progress after several years to develop either tertiary gummatous syphilis, characterized by chronic inflammation of skin, bones, mucous membranes and viscera, or quaternary syphilis, typified by neurological and cardiovascular disease.

T. pallidum can infect the fetus transplacentally leading to intrauterine death and midtrimester abortion. In surviving fetuses intrauterine growth restriction and prematurity are likely to occur.

Congenital syphilis may be evident at birth or not seen until the child is six months of age .

Serological test for syphilis includes the Venereal Disease Research Laboratories (VDRL) which is non specific. Highly sensitive specific treponemal antibody tests include the absorbed fluorescent treponemal antibody test and the Treponema pallidum haemagglutination (TPHA) test.

These tests may remain positive for many years, even after the disease has been effectively treated.

Candidiasis:

Vulvovaginal candidiasis occurs worldwide. About 75% of women will experience an episode at sometime, usually in relation to pregnancy or following antibiotic therapy. Other predisposing factors include the intake of some high dose oestrogen, contraceptive pills and glycosuria.

It is a fungal infection with *Candida albicans*. Other *candida spp* such as *C.glabrata* account for less than 10% of cases, but may be more resistant to treatment.

Although sexual acquisition probably plays only a small role in the aetiology of *Vulvovaginal candidiasis*, the infection can be passed to male partners, who may act as asymptomatic reservoirs of reinfection or may develop symptomatic balanitis.

C. albicans is an opportunistic pathogen which requires an underlying deficit in host local or systemic immunity in order to invade the vagina and cause disease.

Vulvovaginal candidiasis is a well-recognized complication of the reduced cellular immunity in late pregnancy and in all pathological states associated with immunosuppression including HIV.

Classical symptoms and signs include vaginal itching, odour-less curdy white discharge “cottage cheese”, dysparunia and erythema of the labia and vulva. The diagnosis should be confirmed and other pathogens excluded by thorough microbiological investigation.

Positive direct microscopy has a very high diagnostic value. Gram staining could show the Gram-positive mycelia of the fungus.

Culture remains the most sensitive method currently available for the detection of the candida. It will give a positive result in carriers as well as from women with symptomatic vulvo-vaginal candidiasis.

Therefore, culture is only recommended if vaginal candidiasis is clinically suspected but that wet mount microscopy is negative.

Bacterial vaginosis:

It is one of the commonest causes of abnormal vaginal discharge. It is a complex condition in which a polymicrobial vaginal flora replaces the normal predominant lactobcilli.

The bacteria involved include *Gardenerella vaginalis*, Bacterides species, Mycoplasma hominis and Mobiluncus species. Their metabolism produces biologically active metabolites, including volatile amines, which cause the characteristic fishy smell of the condition. This is associated with a thin grey or white vaginal discharge that is sometimes frothy. Many women with bacterial vaginosis are asymptomatic.

Clinical diagnosis of bacterial vaginosis can usually be confirmed by simple tests on the vaginal discharge.

Typically the pH is greater than 4.5. Microscopy of a wet film shows active motility of *Mobilincus spp*., and masses of small bacteria coating epithelial cells “clue cells”. The bacteria are Gram-negative. Culture can be misleading.

Newer methods of diagnosis are mainly used for research purposes at present.[(22)]

Human immunodeficiency virus:

The human immunodeficiency virus (HIV), which is the causative agent of acquired immunodeficiency syndrome (AIDS) is

transmitted between humans mainly by sexual contact. Other routes of transmission are: peri-anal, from an infected mother to her child, by transfusion of infected blood and through exposure to contaminated needles or other skin piercing objects. Two types of HIV have been recognized, HIV-1 and HIV-2.

HIV belongs to the family retrovirdae. Retrovirus virions are spherical, measure 80-130nm in diameter and have a three layered structure.

The genome nucleocapsid complex consists of single stranded RNA molecules. Each virion is diploid so it contains two identical copies of its RNA genome; the genome has reverse transcriptase molecules. The RNA is surrounded by a capsid consisting of core proteins .An envelope derived from host cells surrounds the viral core.

People infected with HIV usually develop antibodies to the virus within 1-4 months of infection (window period) i.e. the time for sero-conversion to be detected by the current available sero-diagnosis assay.

The following methods are used for diagnosis or confirmatory procedure:

1- Serological screening procedures:

- Enzyme linked immunosorbent assays (ELISA).
- Agglutination assays.
- Immunodot assays .

2- Serological supplement tests:-

- Western blot.
- Indirect immunofluorescence.
- Radio immunoprecipitation.
- Line immunoassay.

Sensitivity and specificity are two major factors that determine the accuracy of a test in distinguishing between infected and uninfected persons. A test with high specificity will have few false positive results, and should be used when there is a need to minimize the rate of false positive results. “E.g. for the diagnosis of HIV infection in an individual” Although the sensitivity and specificity of individual tests may vary, both should meet minimum standards (99% and 95% respectively). [23]

There are three main objectives for which HIV autoantibodies testing is performed: -

i- Transfusion, transplant or donation safety.

ii- Surveillance e.g. for the purpose of monitoring the prevalence of HIV infection overtime in given population.

iii- Diagnosis of HIV infection: voluntary testing of serum from asymptomatic persons or from persons with clinical signs and symptoms suggestive of infection or AIDS.

The prevalence of STIs:

Women at the reproductive age represent a sector of the community who is sexually active and hence are prone to STIs.

Many studies around the world have tried to assess the prevalence of STI with different result due to several factors.

Wong M.L and his colleagues in Singapore compare the prevalence of STIs between freelance and brothel-based sex workers. They found that the two most common STIs in both groups were chlamydial cervicitis and syphilis. [24]

A survey on the STI in the rural region of Chatlon conducted by Tajikistan Republican Reproductive Health center investigated 1034 women, among these women 75.7% of the examined cases revealed a variety of STI. trichomoniasis 25.3%, candidiasis 17.9% chlamydia trachomatis 14.9%, syphilis 5.6 % and gonorrhea 0.2 % . STI were most commonly found in the 21-39 age group.

Furthermore, STI screening of the 19-20 age group revealed that 77.7 % had vaginal discharge.[25]

A clinical trial was conducted to determine the prevalence of *Neisseria gonorrhea* and other STI causing organisms. This study was done by Divekar *et al.,* in Mumbai, India, who investigated 336 female attending STIs clinic. The study showed that 9.7 % of the women were gonorrhoea –positive, 23.3% were chlamydia-positive and 5.9% were trichomonas-positive. Moreover, HIV was more prevalent among female sex workers ($p<0.001$). The author concluded that gonococcal infection is significantly associated with HIV .An important correlation between sex behaviour and the prevalence of gonorrhea, trichomoniasis and HIV was found. [26]

Dada A.J. and his colleagues in Logos, Nigeria, had undergone a serosurvey of syphilis and human immunodeficiency virus antibodies among 796 females. The sero-prevalence rates were 4% for rapid plasma reagin (RPR) and TPHA assay confirmed syphilis, 12 % for HIV –1, and 2 % for HIV – 2.[27]

Ramon R. and his colleagues tried to assess the prevalence of HIV in women of childbearing age in Abidjan, cote de lvoire. In this study HIV testing was systemically offered to a total of 1482 non-pregnant women 20-50 years of age attending two gynecological clinics. The prevalence of HIV infection in this sample

was 21.3%.[28]In fact Cote de Ivoire has one of the highest HIV prevalence rates in west Africa.[29]

Paris M and his colleagues conducted a study about the prevalence of gonococcal and chlamydial infection among commercial sex workers in Iquitos, peru, which revealed that 22% of these females were positive for chlamydia and 14% positive for gonorrhea. These high infection rates were attributed to the lack of knowledge regarding HIV and STI in addition to the high-risk behavior among this population.[30]

The prevalence of STI and the frequency of genitourinary symptoms and signs were assessed in 1233 females aged 18-45 years, of mean age 26, in Yasunde and Douala, Cameroon.

Rayan KA and his colleagues conducted this study. They found that 11% had gonorrhea, 12% had chlamydia, 3% had both. 20% had a positive wet mount for trichomoniasis. 65% reported abnormal vaginal discharge and 44.7% reported pelvic pain. Clinical diagnosis for cervicitis and trichomoniasis in this study had sensitivity of less than 50% and specificity of greater than 65%. They concluded that: clinical diagnosis was not an accurate predictor of infection at the individuals level.[31]

Ramjee and his colleagues conducted a study to assess the prevalence of STI, including HIV, among 145 female prostitutes

working at truck stops in the Kwazulu- natal midlands of South Africa. The examinations found that 50.3% of the women were HIV positive, 41.3% were infected with *Trichomonas vaginalis*, 40.6% had *Candida albicans*, 14.3% had *Neisseria gonorrhoeae*, 16.4% had *Chlamydia trachomatis*, 71% had bacterial vaginosis and 42.1% had active syphilis.[32]

A randomized, community trial of intensive STI control for AIDS prevention was conducted by Wawer MJ and his colleagues in Rakai, Uganda. They investigated 56 communities, which are grouped into 10 clusters. 16.9% of the subjects were HIV-positive, 10.0% had syphilis, 23.8% of women had trichomoniasis, and 50.9% had bacterial vaginosis. They suggested that detailed STI assessment expected to document the relationship between STI control and HIV. Moreover, it will identify which STI confer the greatest population attributable risk for HIV transmission, facilitating targeted control efforts in the future.[33]

Sarkar S and his colleagues conducted a study to assess the prevalence of HIV antibody and selected STI in a resident population of 593 brothel-based female prostitutes in a business town 100km from Dhaka, Bangladesh. No HIV antibody was found in any of the blood samples. 57.1% women, however, has evidence of either past or present infection of syphilis as measured by TPHA

testing, 6.8% were VDRL-positive at a more that 1:8 dilution, and 28% were infected with either gonorrhea or chlamydia. This high prevalence of gonorrhea or chlamydia and TPHA detected in this study suggest that HIV infection would spread rapidly if introduced in this population, and later expulsion into the population.[34]

A cross-sectional study conducted in Burkina Faso's two largest cities[35] (Ouagadougou and Bobo-Dioulasso) in 1994 investigated the prevalence of HIV infection and other STI among 426 female sex workers. The overall HIV prevalence was 58.2% and 52.6% had at least one STI: primarily trichomoniasis 23%, syphilis 15%, and gonorrhea 13%. The study identified the following significant, Independent risk factors for HIV infection.

i- Two or more pregnancies.

ii- Low perception of personal risk of HIV.

iii-Syphilis.

iv- The presence of genital warts.

A cross-sectional study conducted in five locations in Cambodia in 1996 compared the prevalence of HIV and other STI in 34 women seeking reproductive health services, 322 police and military personnel, and 437 brothel- based sex works. Among sex workers 38.7% had chlamydial and/or gonococcal infection and 13.8% were syphilis seroreactive. Among police and military

personnel, 2.1% had chlamydial infection, 5.0% had gonorrhoea and 6.6% were syphilis sero-positive. 5.3% of the reproductive health care clients had chlamydial and/or gonococcal infection and 4.0% were syphilis sero-positive. HIV prevalence was 40.6% among sex worker, 12.5% among police and military personnel, and 4.5% in the reproductive health client group.[36]

Gyanaecological conditions associated with HIV infection were examined in 481 regular female sex partners of HIV-positive male blood donors in a study of heterosexual HIV transmission conducted at Chiang Mai University Hospital in Thailand in 1992-1996. Of these women 46.6% were HIV infected. A history of STI was more common among the HIV-infected women 31.7%. HIV-infected women also were more likely to have abnormal vaginal discharge and cervical dysplasia (confidence intervals were 1.6%-4.2 and 2.0-15.2 respectively). Among HIV positive women, the prevalence of abnormal vaginal discharge and bacterial vaginosis increased significantly with decreasing CD4 count. Syphilis, gonorrhea, chlamydia and trichomoniasis rate generally low and did not differ by HIV status.[37]

A multi-center prevalence survey was conducted by Mother care Indonesia to examine the presence and magnitude of a reproductive tract infection/ STI problem. A total of 344 married

women aged 18-45 was enrolled as study sample. 23% were found to be positive for at least one STI. About 44% tested positive for candidiasis, 12.6% tested positive for more than one STI, 4.3% tested positive for gonorrhea, 7.7% tested positive for chlamydia. None of the women tested positive for syphilis.[38]

Meda N. and his colleagues in the gynaecology and Obstetrics Department at the National Central Hospital Souro Sanou in Burkina Faso conducted a study to determine the prevalence of STI and HIV among 220 non-pregnant women of reproductive age.[39] They found that 77% had one STI. The most common STI were *Trichomonas vaginalis* 28% and *Chlamydia trachomatis* 27%. 42% were HIV positive. HIV positive women were significantly more likely than HIV- negative women to be infected with *Neisseria gonorrhea* (30.4% vs 24.2%, P= 0.03). They concluded that women with genital infections are a group at high risk of HIV and other STI and a target population for preventive interventions.

A seroprevalence survey conducted among 2240 individuals from Alexandria, Egypt confirmed assumptions of a low rate of HIV infection in Egypt. Reuganathan E. *et al* conducted this study. Overall, only 1.5% of the respondents were HIV seropositive by ELISA. The low rate of HIV prevalence is Egypt is presumed attributable to cultural factors as suggested by the authors.[40]

Management of STI:

There is considerable evidence that infection with STI significantly increases one's risk of contracting and transmitting HIV.[41] Therefore, improved STI treatment reduced HIV infection by 40%, as proved by a study in a rural population in Tanzania.[42]

In fact there are two approaches for management of STI:

1- The etiological approach:

Aetiological diagnosis is often regarded as the ideal approach in medicine. It enables service providers to make precise diagnosis and treat their patients with equal precision. In so many instances it can be very essential in helping our patients. However, it has some problems. First of all, it needs good laboratory equipments and skilled personnel which are not widely available in many of the developing countries.

Infact, there are a large number of different bacteria, viruses and other pathogens that can be transmitted from one person to another during sexual intercourse. Therefore, to reach an aetiological diagnosis we may sometimes need sophisticated equipments.

Moreover, the range of existing laboratory test for STI is a little pit limited, and reaching an etiological diagnosis of most STI can be difficult, particularly in women e.g. both gonococcal and chlamydial infection in women currently have to be diagnosed through either culture techniques or antigen or genomic detection. However, both techniques are expensive.

Lastly, even when there is access to reliable laboratory facilities, there are some delays in reporting test results and hence in treatment of STI cases. Delays in treatment can undermine the confidence a patient has in service providers. STI patients expect service providers to make a prompt and reasonably accurate diagnosis. They may also result in a significant proportion of clients refusing to attend for follow up.

So, to summarize the etiological approach has some problems, nevertheless it has a place in treating patients of STI.

2- Syndromic care management:

A syndrome is simply a group of the symptoms a patient complains of, and signs discovered in examination. Syndromic case management as its name implies, depends on being able to identify and treat the syndrome caused by STI. In fact in many parts of Africa, no resources exist with which to properly diagnose STI. Therefore, the world Health Organization (WHO) promotes the

syndromic management of STI as an alternative approach to diagnosing and treating STI patients. The clinician who uses the syndromic approach bases his diagnosis and treatment upon syndromes; groups of clinical findings and patients symptoms, rather than the identification through expensive and time-consuming laboratory tests. [43]

The symptoms and signs caused by different STI are similar enough to be easily recognized clinically. STI give rise to small number of clinical symptoms:

1- Vaginal discharge in women.

2- Urethral discharge in men.

3- Genital ulcers in both sexes.

4- Swollen scrotum.

5- Lower abdominal pain.

6- Inguinal bubo swelling.

7- Eye discharge in neonates.

Treatment is offered for all diseases which could cause a given syndrome. Because the seven syndromes are easy to identify, it has been possible to use a clinical flowchart for each one. Health care personnel use this simple flowcharts which map out the steps needed to determine symptoms and treatment.[44]

Among the advantages of this approach are its cost-effectiveness, simplicity and rapidity. Its limitations include a tendency toward over-treatment, poor performance in low-prevalence areas and the neglect of asymptomatic patients.[45]

Comprehensive STI care management include other factors such as.[46]

- A viability of appropriate drug therapy.
- Education on how to reduce the risk of re-infection.
- Promotion of condoms.
- Treatment of patient's sexual contact.
- Attendance for a follow up examination.

Control and prevention of STI:

STI interact uniquely with HIV infection, regardless of the form of sexual transmission of HIV. Both STI and HIV infections are behaviorally and biologically intertwined with one another. This concept is called epidemiologic synergy since they facilitate the sexual transmission of one another. Innovative and comprehensive STI control programs along with community and individual-based prevention programs should provide a more effective HIV control program by reducing the efficiency of HIV transmission in high risk individuals.[47]

The WHO recommended that effective STI control should continue to be a key component in HIV control efforts in areas where STI are prevalent.[48]

This concept has been supplemented by virology studied showing that inter-current STI increases concentration of HIV in genital secretions,[49,50,51] but more importantly, it has been shown that improved clinical services for STI can significantly reduce the incidence of HIV in developing countries “the study of Tanzania”[42]

There should be a certain policy and programs to control and prevent STI. Ten steps should be considered so as to organize an advocacy campaign. This ten steps are defining the issue, developing a strategy, refining the message, organizing a constituency, informing policy makers, maintaining momentum, recovering from setbacks, negotiation, celebrating success and ongoing advocacy.[52]

Health education:

Since STI, HIV are diseases that are strongly related to behaviour, health education will remain a cornerstone in the prevention and management. In fact, considerable resources were devoted to prevention through health education but practically there was little evidence that it affected sexual behaviours in the developing countries.

Denial and Moralization among common people were major obstacles in assessing one's risk from the disease. As only weapon against HIV/AIDS, awareness should lead to behaviour change among the population.[53]

A report on the AIDS epidemic in the African continent concluded that active government programs and strong Islam influence had resulted in a minimal incidence of HIV transmission in Western Africa.[54]

So our Islamic religion could be incorporated in the active health education programs against STI.

Condoms promotion:

A study in a South African mining community saw a 30% reduction in overall STI prevalence as the miners increased their prevalence of condom use from 13% to 29%.[55] Furthermore, condoms promotion through social marketing had shown some successes e.g. in Ethiopia.[56] and Thailand. [57,58]

It is important that resources for STI control should be concentrated on individuals at higher risk and that both sexes should be included; indeed it makes more sense to target men, who are perhaps at greater risk than their spouses and in whom the manifestations of STI are easier to recognize.[59]

Targeted programmes aimed at modifying the sexual behaviour of men and women through peer-education, increasing condom use and providing STI services near the work place have demonstrated their acceptability and effectiveness in reducing STI/HIV incidence among distance tracks drivers, factory workers and prostitutes in Eastern and Southern Africa.[60,61]

Partner notification:

Some people with symptom-less STI may be detected and treated through partner notification. Screening programmes that rely on laboratory test should be used. On the other hand in certain population with high prevalence of symptomless STI, the potential impact of targeted presumptive antibiotic treatment has been demonstrated.

Finally there are many areas where more research and work are required in both low prevalence and high prevalence areas and would be greatly simplified with the development and distribution of low cost, effective and simple-used diagnostic tests for common STI. These tests should be able to identify symptoms-less patients.

Researches should continue on the development of affordable and effective vaccine against STI. [62]

OBJECTIVES

1- To determine the prevalence of the common STIs and candidiasis in women attending Omdurman Teaching Hospital and Police Central Hospital, Gynaecological Clinics.

2- To evaluate the sensitivity and specificity of vaginal discharge as a diagnostic tool for some STIs.

3- To suggest a suitable line of management of STIs.

MATERIAL & METHODS

1- Settings and duration:

This study was carried out In Omdurman Teaching Hospital and police Central Hospital in the Gynecological referred clinics in the period from August 1999 to February 2000.

2- Population:

Khartoum is the capital of Sudan with estimated population of 4.6 millions according to the last national census; they represent different ethnic and racial groups. These two hospitals were selected because they are central referral clinics that are accessible to many people and attended by different socioeconomic classes.

A total number of one hundred and ten non-pregnant females attending gynecological clinics for various reasons were selected randomly (1 in 4). Informed consent was taken from each patient before sample collection.

3- Inclusion criteria:

All ladies attending the gynecological clinics.

4- Exclusion criteria:

a. Virgin ladies.

b. Pregnant ladies.

c. Ladies who are menstruating at the time of sample collection.

d. Ladies who had taken any antibiotics within the last three weeks.

5- Data collection:

The data was collected through:

1- Interviewed administered questionnaire.

2- Clinical examination.

3- Laboratory tests.

The questionnaire included questions on the age, occupation and husbands' occupation, number of children and presence of vaginal discharge, its colour, amount, odour and other related symptoms.

Clinical examination and laboratory tests:

The examinations were conducted at the gynecological clinic, following informed consent, which included a thorough general examination followed by genital examination. Through bivalve speculum, cervical swabs were taken followed by 5 ml of venous blood.

Sample size:

We obtained 220 endo-cervical swabs, 110 of them for culture to isolate and identify *N. gonorrhea* and then for detection of Chlamydial antigen. Also we obtained 110 high vaginal swabs for wet preparation to detect *T. vaginalis* and for Gram stain to detect *C.albicans*. From each patient we took 5.0 ml of venous blood for serology of HIV and Syphilis.

Collection of specimens:

1- *Endocervical swabs:*

From each patient enrolled in the study, a doctor using the following steps collected two endocervical swabs.

Exocervical area was cleaned with sterile gauze before sampling process, to remove excess of mucus then the cotton swab was inserted into cervical canal and rotated vigorously for 5-10 seconds, and inserted as soon as possible into QUORUM EIA chlamydia Ag transport medium. Enzyme-immunoassay for the detection of chlamydia is then performed.

2 -High Vaginal swabs (HVS):

A doctor by using sterile speculum with sterile cotton swab collected HVS from each patient and immediately the swabs were inoculated either into sterile physiological saline or Amies transport medium so as to perform the microbiological examinations.

3- Venous Blood:

We obtained 5 ml venous blood from each patient attending previous clinics by using vacutainer tube. The sera was then separated and stored at -20°C freezer so as to perform certain immunoserological tests for both syphilis and HIV.

I- Microbiological methods:

Microscopical examination:

- *Wet preparation:-*

Specimens of HVS as collected above were examined by wet preparation method. A drop of physiological saline (10%koh) covered by a cover slip, then HVS was squeezed on the slide and examined microscopically, for motile *T. vaginalis* and *Candida spp*. using10x and 40x.

- *Gram stain:-*

Specimen of HVS collected as previously described were also examined by Gram stain .The smears from the swabs should be fixed on slide using 70% of ethanol, then stained with Gram stain to detect if Gram positive yeast cells present or not.

Also specimens of endocervical swabs as previously described were examined by Gram stain techniques to detect if gram-negative diplococci within polymorph nuclear leukocytes present or not.

II- Culture methods:

Culture of HVS on Sabouraud dextrose agar:

Specimens of HVS were inoculated into Sabouraud dextrose media agar under aseptic technique, and incubated at

35- 36ºC for two days. The evidence growth of *Candida* indicated by white to creamy colonies, characterized by yeast smell. Then the growth colonies were examined by direct microscopy using either stained or unstained smear techniques. In addition, Identification of *C. albicans* was confirmed by the Germ tube test (GTT). Colonies suspected *Candida albicans* were emulsified into small tube containing about 0.1 ml of sterile human serum and incubated at 36ºC in water bath for 2-3 hours (Kafi 1997) then examined for germ tube outgrowth that form yeast cells.

III-Serological methods:

1- QUORUM EIA CHLAMYDIA:

- *Principle of the Assay:*

Coated microtitration wells are used as the solid phase media. Chlamydiae are boiled to solubilize chlamydia (LPS). The solubilized chlamydia (LPS) test samples are applied to the wells and incubated. After incubation, monoclonal antibody reagent is added to each well and incubated. This reagent will bind to any chlamydia LPS present wells. After washing, an anti- mouse lgG antibody with Horseradish Peroxidase enzyme (conjugate), is added After a 30 minutes incubation at 37ºc, the wells are washed to remove unbound labeled antibodies. On addition of the substrate (TMB) a colour will develop only in those wells in which enzyme is

present, indicating the presence of chlamydia. The reaction by the addition of stop solution and the absorbance is then measured at 450 nm. The cut- off value is calculated and the samples with absorbents greater than the cut-off are considered positive.

- *Assay procedure:*

1- Preheat a humidity box to 37ºC.

2- Prepare a Data Sheet to identify the individual wells for each sample and control. It is recommended to run one set of standards in each sample run. Unused strips should be resealed in the foil bag, containing the desiccant, using the resealing zip-lock before being replaced.

3- Pipette 100µl of prepared specimens and positive and negative controls into their assigned wells. Include one positive and 2 negatives in each assay run.

4- Incubate for 30 minutes at 37ºC in the humidity box.

5- Remove the plate from the humidity box replacing the humidity box at 37º C to maintain temperature.

6- Add 100µl of monoclonal antibody reagent to each well. Tab gently for 5 seconds to ensure mixing the volume in each well will now be 200µL.

7- Incubate for 30 minutes at 37ºC in the humidity box.

8- At the end of the incubation period remove the plate from the humidity box and return the box to 37ºC. Discard the contents of the well by turning the plate rapidly upside down over a Biohazard container. Then strike the plate (still upside down) against absorbent paper or paper towel. Ensure adequate disinfectant is contained in the Biohazard container.

9- Wash the empty wells 4 times with the diluted Wash Buffer .The direction of filling the plate in each cycle must by alternated; i.e. if the plate is filled top to bottom for the first wash; fill from bottom to top for the second wash.

10- Strike the wells sharply onto absorbent paper towel to remove all the residual water.

11- Add 100µl of Anti- Mouse Peroxidase to each well and incubate for 30 minutes at 37ºC in the humidity box.

12- Add 100 µl of TMB Substrate to well and gently mix for 5 seconds.

13- Incubate at room temperature (20°C - 25°C) for 10 minutes in the dark.

14- Stop the reaction by adding 100 µl of stop solution to each well.

15- Gently mix for 30 seconds to ensure that the blue colour changes completely to a yellow colour.

16- Immediately read the optical density at 450nm with a microtitre plate reader blanked on air.

2- Serological diagnosis of syphilis:

We tested all sera of the patients for syphilis using Rapid Plasma Reagin (RPR), those who are tested positive are retested using the specific treponemal test (TPHA) for confirmation of syphilis.

I- IMMUNTREP-RPR:

Immuntrep-RPR is a non-treponemal Rapid Plasma Reagent flocculation test for syphilis reagent antibodies in serum or plasma. It is a modified form of IMMUTREP-VDRL ANTIGEN which contains carbon particles to improve the visual reading of the result. The use of the carbon opiates the requirement for a microscope when recording the test results. The test can be performed on heated, unheated serum or plasma and is therefore very versatile. The test Kit is complete in that it provides test cards pipette/stirrers, antigen dispensers and positive and negative controls.

II- Treponema pallidum Haemoagglutination assay (TPHA) (Wellcosyph HA)

Wellcosyph HA is a rapid assay for in vitro specific antibodies to *T. pallidium* in human serum by indirect haemoagglutination (IHA) method. Preserved avian erythrocytes are

coated with antigen components of pathogenic *T. pallidium* (Nicols strain). These cells agglutinate in the presence of specific antibodies to *T. pallidium* and show characteristic in microtitration plates.

Procedure:-

Each test requires 4 well of microtitration plate: -

1- 25 µL of Diluent's buffer containing 0.1 %sodium azide were added to each of 1,3,4 while 100µL were added to well 2.
2- 25 µL of patient serum was added to well 1 by using micropipette.
3- Using micropipette the contents of well 1 were mixed 25µL were transferred to well 3. Well 3 was mixed and 25µLfrom well 2 was transferred to well 4.Well 4 was mixed and 25µL was discarded.
4- Two further pairs of wells are required for the positive and negative controls.
5- The Test and Control cells were re-suspended. 75µLof Control cells were added to well 3 while, 75µL of test cell was added to well 4. Tapping all four sides of plate mixed contents of the plates. The plate was incubated at room temperature for 45- 60 minutes.

Reading of results:

Positive results:

A strong positive result will appear as smooth material at test cells on the bottom of the well, some times with folded edge. With less strongly reacting sample this material will be smaller and may be surrounded by a circle of cells.

Negative results:

A negative result is indicated by a compact bottom of non-agglutination test cells without a very small hole in the centre.

3- Biotest anti HIV-1-2 recombinant (ELISA):

The biotest anti HIV-1-2 recombinant is very sensitive solid phase enzyme immunoassay in which highly purified recombinant viral antigens are used for the combined detection of anti bodies to HIV-1 and HIV-2.

The immuno-dominant-N-terminal parts of the transmembrane proteins gp41 and gp 35 of HIV-1 and HIV-2 as well as the highly reactive core antigen p24 of HIV are produced from the bacteria (*E. coli*) by means of recombinant technology; these antigens are highly purified and used for coating microtest plate.

During serum incubation HIV specific antibodies bind to the recombinant viral antigens.

Unspecific antibodies are removed by subsequent washing step. The antigen-antibody complexes formed during first incubation steps are detected with highly specific enzyme labeled monocolonal antibodies directed against human IgG.

The enzyme activity of the bound conjugate is then determined. The reaction is stopped using H_2SO_4.

Procedure:

- Using a micropipette, with disposable tips, 50 μl of test serum were added, each into a microwell.
- 50 μL of the negative control serum were added into three microwells.
- 50 μL of the cut-off control serum were added into two microwells.
- 50 μL of positive control serum were added into one microwell.
- 75 μL of working strength conjugate were added to all microwells using a multichannel micropipette.
- Plates were covered and incubated in a water-path at 37°C for one hour.
- After the period of incubation the plates were washed as described by the manufacturer.

- 100 μL of the pink coloured substrate solution were added to each microwell and the plated were covered and incubated at 37°C for 20 minutes.
- 100 μL of the stop solution (2M sulphuric acid) were added to each microwell and the plates were read within 30 minutes using a microwell plate reader.

The presence or absence of antibodies to HIV-1-2 is determined in relation to the mean absorbance of the cut-off control serum. Samples with absorbance readings equal to or less than the mean absorbance of the cut-off control serum are considered as reactive for antibodies to HIV-1-2. Absorbance readings of the negative and positive control samples are used to determine the validity of the test results.

RESULTS

Table 1 shows the distribution of the studied population according to the age. Most of the cases (39.1%) aged between 26-35 years.

Table 2 shows that most of the cases are multiparous (60.9%), while nulliparous accounted for 22.7% and primiparous accounted for only 16.4%.

Table 3 shows that most of the studied populations are housewives (80.9%).

Table 4 shows that, 27.3% were married to policemen, 14.5% to labourers, 10% to employees, 8.2% to drivers and 40% to those with other occupations.

Table 5 shows the prevalence of STI and candida in the studied population, as follows: Chlamydial infection (9.1%), candidal infection (19.1%), Trichomoniasis (6.4%), gonoccal infection (1.8%), confirmed syphilis (5.4%) and HIV (1.8%).

Tables 6 & 7 show that the overall prevalence of STI was 38.2%, while the prevalence of more than one STI is 4.5%.

Table 8 shows that the prevalence of vaginal discharge in the studied population is 83.6%.

Table 9 shows the prevalence of vaginal discharge according to its colour. White curdy discharge account for 72.8% of

those with vaginal discharge, yellowish vaginal discharge found in 14.1% and greenish vaginal discharge in only 3.3%. 9.8% of the vaginal discharge was a clear one.

Table 10 shows that yellowish vaginal discharge is neither sensitive nor specific for diagnosis of chlamydial infection with sensitivity and specificity of 20% and 89% respectively.

Table 11 shows that greenish vaginal discharge is not good predictor of trichomoniasis with positive predictive value of 33.3%. However, it has a good specificity (98.1%).

Table 12 shows that white vaginal discharge has poor positive and negative predictive values (20.9%) and (80.6%) respectively for the diagnosis of candidal infection.

Table 13 shows that, 50.5% of those with vaginal discharge had copious discharge and 49.5% had slight discharge.

Table 14 shows that the sensitivity of the presence of copious vaginal discharge for the diagnosis of trichomoniasis was 57.1% and its specificity was 50%.

Table 15 shows that the sensitivity of copious vaginal discharge for the diagnosis of chlamydial infection (66.7%), while its specificity was 52.4%.

Table 16 shows that offensive vaginal discharge has a sensitivity of 42.9% for the diagnosis of trichomoniasis.

Table 17 shows that the prevalence of genital ulcer as a complain in the studied population was 6.4%.

Table 18 shows that the presence of genital ulcer on examination of the studied population has a sensitivity of 16.7%.

Tables 19 & 20 show that the husband's occupation does not significantly increase the risk or trichomoniasis or chlamydial infection.

Table 21 shows that the prevalence of some related STI symptoms as follow; burning micturition (58.2%), womb pain (66.4%) and pain during sexual intercourse (50.9%).

Table 22 shows the prevalence of pelvic tenderness during examination in the studied population was 26.4%.

Table 23 shows that the prevalence of some examination findings in the studied population; 25.7% had abdominal tenderness, 2.7% had vesicles on the genitalia, 85.5% had vaginal discharge, 30% had a discharge from the cervix, 7.3% had ulcers on the cervix and cervical excitation sign was found in 5.6%. There were no cases of genital warts, skin rash or generalized lymphadenopathy.

Table 1:

Distribution of studied population according to age

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Range (in years)	No. of patients	%
18 – 25	35	31.8
26 – 35	43	39.1
> 35	32	29.1
Total	**110**	**100**

Table 2:

Distribution of studied population according to parity

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Parity	**No. of patients**	**%**
Nulliparous	25	22.7
Primiparous	18	16.4
Multiparous	67	60.9
Total	**110**	**100**

Table 3:

Distribution of studied population according to occupation

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Occupation	No. of patients	%
Housewives	89	80.9
Students	04	3.6
Employee	01	0.9
Others	16	14.5
Total	**110**	**100**

Table 4:

Distribution of studied population according to husband's occupation (O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Husband Occupation	No. of patients	%
Employees	11	10.0
Policemen	30	27.3
Labourers	16	14.5
Drivers	09	8.2
Others	44	40.0
Total	**110**	**100**

Table 5:

Prevalence of different STIs and candida in the studied population (O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

STI	**No. of patients**	**%**
Chlamydia trachomatis	10	9.1
Candida albicans	21	19.1
Trichomonas vaginalis	07	6.4
N. gonorrhea	02	1.8
Syphilis: - RPR - TPHA	 12 06	 10.9 5.4
HIV	02	1.8
Total	**48**	

Table 6:

Overall prevalence of STI in the studied population

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

STI	No. of patients	%
Had at least one STI or candidiasis	42	38.2
Had no STI or candidiasis	68	61.2
Total	**110**	**100**

Table 7:

Prevalence of more than one STI in the studied population

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

No. of STI	**No. of patients**	**%**
Had one STI	37	33.6
Had two STI	05	4.5
Had three STI	0	0
Total	**42**	

Table 8:

Prevalence of vaginal discharge in the studied population

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Vaginal discharge	**No. of patients**	**%**
Had vaginal discharge	92	83.6
Had no vaginal discharge	18	16.4
Total	**110**	**100**

Table 9:

Distribution of vaginal discharge according to its colour

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Colour of the discharge	No. of patients	%
White-curdy	67	72.8
Yellowish	13	14.1
Greenish	03	3.3
Clear	09	9.8
Total	**92**	**100**

Table 10:

Sensitivity and specificity of a yellowish vaginal discharge for diagnosis of chlamydia (P = NS)

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Chlamydia / **Yellow discharge**	**Positive chamydia**	**No chlamydia**	**Total**
Yellow vaginal discharge	2 **(15.4%)** **(20%)**	11 **(84.6%)** **(11%)**	13
No yellow vaginal discharge	8 **(25.8%)** **(80.0%)**	89 **(74.2%)** **(89%)**	97
Total	**10**	**100**	**110**

- *Sensitivity: 20%.*
- *Specificity: 89%.*
- *Positive predictive value: 15.4%.*
- *Negative predictive value: 74.2%.*

Table 11:

Sensitivity and specificity of greenish vaginal discharge for diagnosis of Trichomoniasis (P=NS)

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Trichomonaisis / Greenish discharge	Positive Trichomoniasis	No Trichomoniasis	Total
Green vaginal discharge	1 **(33.3%)** **(16.7%)**	2 **(66.7%)** **(1.9%)**	3
No green vaginal discharge	6 **(5.6%)** **(83.3%)**	101 **(94.4%)** **(98.1%)**	107
Total	**7**	**103**	**110**

- *Sensitivity: 16.7%.*
- *Specificity: 98.1%.*
- *Positive predictive value: 83.3%.*
- *Negative predictive value: 94.4%.*

Table 12:

Sensitivity and specificity of a white vaginal discharge for diagnosis of candida (P=NS)

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Candida / Witish discharge	Positive Candida	No Candida	Total
With vaginal discharge	14 **(20.9%)** **(66.7%)**	53 **(79.1%)** **(59.5%)**	67
No vaginal discharge	7 **(19.4%)** **(33.3%)**	36 **(80.6%)** **(40.5%)**	43
Total	**7**	**103**	**110**

- *Sensitivity: 16.7%.*
- *Specificity: 40.5%.*
- *Positive predictive value: 20.9%.*
- *Negative predictive value: 80.9%.*

Table 13:

Amount of discharge in those with vaginal discharge

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Amount of discharge	**No. of patients**	**%**
Copious discharge	46	50.5
Slight discharge	45	49.5
Total	**91***	**100**

** in one patient the amount of the vaginal discharge is not mentioned.*

Table 14:

Relation of copious vaginal discharge for diagnosis and trichomoniasis infection (P=NS)

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Copious / **Trichomoniasis**	**Positive trichomoniasis**	**Negative trichomoniasis**	**Total**
Copious discharge	04 **(8.7%)** **(57.1%)**	42 **(91.3%)** **(50%)**	46
Slight discharge	03 **(6.7%)** **(42.9%)**	42 **(93.3%)** **(50%)**	45
Total	**7**	**84**	**91**

- *Sensitivity: 57.1%.*
- *Specificity: 50.0%.*
- *Positive predictive value: 8.7%.*
- *Negative predictive value: 93.3%.*

Table 15:

Relation of copious vaginal discharge and chlamydial infection

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Copious / Chlamydial infection	Positive chlamydial infection	Negative chlamydial Infection	Total No. of patients
Yes	06	39	45
No	03	43	46
Total	**9**	**82**	**91**

- *Sensitivity: 66.7%.*
- *Specificity: 52.4%.*
- *Positive predictive value: 13.3%.*
- *Negative predictive value: 93.5%.*

Table 16:

Relation between offensive vaginal discharge on examination and trichomoniasis

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Trichomoniasis / Vaginal discharge	Positive trichomoniasis	Negative trichomoniasis	Total
Offensive	03 **(10.3%)** **(42.9%)**	26 **(89.7%)** **(25.2%)**	29
Not offensive	04 **(4.9%)** **(57.1%)**	77 **(95.1%)** **(74.8%)**	81
Total	**7**	**103**	**110**

- *Sensitivity: 42.9%.*
- *Specificity: 74.8%.*
- *Positive predictive value: 10.3%.*
- *Negative predictive value: 95.1%.*

Table 17:

Prevalence of genital ulcer on history

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Genital ulcer	No. of patients	%
Yes	7	6.4
No	103	93.6
Total	**110**	**100**

Table 18:

Genital ulcer as a predictor of syphilis

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Genital ulcer	Positive syphilis	Negative syphilis	Total
Positive history	01	0	01
Negative history	05	104	109
Total	**06**	**104**	**110**

- *Sensitivity: 16.7%*
- *Specificity: 0.0%*

Table 19:

Relation of husband's occupation and chlamydial infection

(P. value = 0.69036843)

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999- Feb. 2000)

Chlamydial infection / Husband occupation	**Positive chlamydial**	**Negative chlamydial**	**Total**
Employee	1 **(9.1%)** **10.0%**	**10** **(90.9%)** **10.0%**	11
Policeman	2 **(6.7%)** **20.0%**	28 **(93.3%)** **28.0%**	30
Labourer	1 **(6.3%)** **10.0%**	15 **(93.8%)** **15.0%**	16
Drivers	2 **(22.2%)** **20.0%**	07 **(77.8%)** **7.0%**	9
Others	4 **(9.1%)** **40.0%**	40 **(90.9%)** **40.0%**	44
Total	10 **(9.1%)**	100 **(90.9%)**	110

- *Chi square: 2.25.*
- *Degree of freedom = 4.*
- *P. value = 0.69036843.*

Table 20:

Relation of husband's occupation and Trichomonas infection

(P. value = 0.69036843)

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Trichomonas infection / Husband occupation	Positive Trichomonas	Negative Trichomonas	Total
Employee	0 **(0.0%)** **0.0%**	11 **(100%)** **10.7%**	11
Policeman	1 **(3.3%)** **14.3%**	28 **(96.7%)** **28.2%**	30
Labourer	2 **(12.5%)** **28.6%**	14 **(87.5%)** **13.6%**	16
Drivers	1 **(11.1%)** **14.3%**	8 **(88.9%)** **7.8%**	9
Others	3 **(6.8%)** **42.9%**	41 **(93.2%)** **39.8%**	44
Total	7 **(6.4%)**	103 **(93.6%)**	110

- *Chi square: 2.58.*
- *Degree of freedom = 4.*
- *P. value = 0.63096176.*

Table 21:

Prevalence of some related symptoms in studied population and their duration

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Symptoms	No. of patients	%	Duration	
			< 1 month	≥ 1 month
Burning mictrition	64	58.2	71%	29%
Womb pain	73	66.4%	52.8%	47.2%
Pain during sexual intercourse	56	50.9%	30.9	69.1%

Table 22:

Prevalence of pelvic tenderness on examination of the studied populations (O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Pelvic tenderness	No. of patients	%
Yes	29	26.4
No	81	73.6
Total	**110**	**100**

Table 23:

Prevalence of some examination findings in the studied population

(O.T.H and P.C.H Gynaecological clinics, Aug. 1999-Feb. 2000)

Examination findings	No. of cases	%
Generalized lymphadenopathy	0	0
Skin rash	0	0
Abdominal tenderness	28	25.7
Vesicles on the genitalia	03	2.7
Vaginal discharge	94	83.6
Discharge from the cervix	33	30.0
Ulcer on the cervix	08	7.3
Genital warts	0	0
Cervical excitation sign	6	5.6

DISCUSSION

Sexually transmitted infections are common problem in the developed and developing countries. We randomly studied 110 women of those who attended the Gynaecological Clinics in Omdurman Teaching Hospital and police central Hospital in the period from August 1999 to February 2000.

The range of most the studied population (39.1%) was between 26-35 years, while 31.8% were between 18-25 years. Multiparous ladies account for 60.9% of cases, nulliparous 22.7% while primiparous accounted for only 16.4%.

The majority of cases were housewife's 80.9%, while 27.3% of the husbands work as policemen. This is because the police central hospital is the main referral hospital for other police health centres. On the other hand it provides free services to all police forces.

The prevalence of *Candida albicans* in this study was 19.1%. In fact, candida is not a STI but it is mentioned here because it is the commonest organism that causes vaginal discharge. This prevalence is low compared to other African countries e.g. South Africa in which Ramjee[32] found that the prevalence was 40.6% compared to Cohen[38] who found that the prevalence in Indonesia

was 44%, the prevalence in our study seems to be lower than other parts of the world.

El haj[19] found a prevalence of 9.1% in a non-pregnant population in a rural Sudanese community; while Ortashi [46] found a prevalence of 13.9% in pregnant Sudanese patients.

The prevalence of *Chlamydia* was 9.1%. This prevalence goes with the study of Cohen[38] in Indonesia who found the prevalence was 7.7%. It may be lower than other parts of the world like South Africa [32] and. Cameroon.[31]

Ortashi[46] found a relatively higher prevalence which was 19.9%. In fact, It was the highest written in the literature concerning Africa and Islamic world.

The prevalence of *Trichomoniasis* was 6.4%, which is a low prevalence compared with the literature[33, 25] where the prevalence was 23.8% and 25.3% respectively, this may reflect the conservative sexual behavior in our studied population.

The low prevalence of *N. gonorrhea* in this study 1.8% goes with other studies,[25,46] which found a prevalence of 2% both. This low prevalence may be due to widely use of antibiotics against gonococcal infection by the general population.

Using R.P.R for the diagnosis of syphilis a prevalence of 10.9% was found. This dropped to 5.4% when the results were

rechecked using TPHA. This highlights the significance of false positive results when using non-specific test for the diagnosis of syphilis. This prevalence is a little pit higher than the literature [27,36] who mentioned prevalence of 4% both. Ortashi [46] found a lower prevalence, which was 2.6%.

HIV infection was detected in 1.8% of the studied population. Renganathan in Egypt [40] found a similar prevalence of 1.5%. Other literature[16]mentioned a prevalence of 0.6% in Sudan. This was in contrast to Ortashi [46] who did not detect any case of HIV in his study. This low prevalence is mainly due to cultural and religious factors in the studied population.

The overall prevalence of STI was 38.2%, while the prevalence of two STI was 4.5%. None of the studied population had more than two STI, so multiple infections is not common.

The prevalence of vaginal discharge was 83.6%, which is a high prevalence. This may be due to the fact that the question about vaginal discharge was not specific. In fact ladies were asked about the presence of vaginal discharge. The question in the questionnaire should have been about abnormal vaginal discharge. This prevalence is high compared to the literature [25, 46] which mentioned a prevalence of 77% and 55.6% respectively.

The colour of the discharge was white curdy in 72.8%, yellow in 14.1%, greenish in 3.3% and clear in 9.8%. The colour of the discharge was found neither sensitive nor specific for the diagnosis of *Chlamydia* (sensitivity 20% and specificity 89%). The sensitivity of greenish vaginal discharge for Trichomonias infection is low 16.7%, however it has a good specificity 98.1%.

White vaginal discharge has poor positive and negative predictive values (20.9% and 80.6% respectively) for the diagnosis of *Candida infection.*

These results reflect the difficulty of predicting the aetiology of vaginal discharge from its colour. In fact this is one of the major problems that face the syndromic approach.

Copious vaginal discharge was prevalent in 50.5% of cases of vaginal discharge. Nevertheless, it was not sensitive nor specific for the diagnosis of *Chlamydia* or *Trichomoniasis*.

Offensive vaginal discharge has a very low sensitivity and specificity for the diagnosis of *Trichomonaisis* (42.9% and 74.8% respectively).

The presence of genital lacer as a complain was 6.4% but this was not significant for the diagnosis of syphilis. Moreover, the presence of genital ulcer was not found to be specific or sensitive for the diagnosis of syphilis.

We found that the husband's occupation does not increase the risk of trichomonas or chlamydial infection.

The prevalence of some related symptoms of STI were, burring micturition (58.2%), womb pain (66.4%) and pain during sexual intercourse (50.9%).

The prevalence of some examination findings were pelvic tenderness (26.4%), abdominal tenderness (25.7%), vesicles on the genitalia (2.7%), vaginal discharge (85.5%), discharge from the cervix (30%), ulcer on the cervix (7.3%) and cervical excitation sign was found in (5.6%).

There were no cases of genital warts, skin rash or generalized lymphadenopathy.

CONCLUSION

- The prevalence of sexually transmitted infections in the studied population is high (38.2%).
- Vaginal discharge is a very common complains with a prevalence of 83.6%.
- Clinical diagnosis is not an accurate predictor of infection at the individual level.
- If the syndromic approach (vaginal discharge syndrome) is applied a lot of cases will be over treated. Many cases will also be missed.
- The high prevalence of STI detected in this study suggests that HIV infection will spread rapidly in the community unless specific measures are taken.

RECOMMENDATIONS

- All patients with vaginal discharge should be assessed further for STI.
- Simple, specific and cost-effective tests for STI should be introduced so as to adopt the aetiological approach in the management of STI.
- Health education remains the corner stone in the prevention of STI/HIV.
- All patients with confirmed STI should receive health education about HIV.
- Identification of population at the greatest attributable risk for HIV, which will facilitate targeted control efforts.
- STI clinics should be established.

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FEDERAL MINISTRY OF HEALTH

SUDAN NATIONAL AIDS PROGRAMME

PREVALENCE OF SEXUALLY TRANSMITTED INFECTIONS IN WOMEN ATTENDING GYNAECOLOGICAL CLINICS IN KHARTOUM

1999

Prevalence of Sexually Transmitted Infections In Women attending gynaecological Clinics in Khartoum

INTERVIEW AND EXAMINATION

A. Interview

1. Study Number ☐☐☐
2. Date Day ☐☐ th Y☐☐ ☐☐
3. Clinic name .....
4. Clinic number ☐☐☐☐

History

5. Age years ☐☐
6. Number of children ☐☐
7. Occupation .....
8. Parent's occupation .....

Symptoms

9. Do you have a genital ulcer Yes No ☐ ☐
   If "no" skip to 13
   If "yes"
10. Is it painful Yes No ☐ ☐
11. How long have you had the genital ulcer da ☐☐
12. Do you have a vagina discharge Yes No ☐ ☐
    If "no" skip to 13
    If "yes"
13. What is the colour of the discharge? .....
14. Is it foul smelling? Yes N ☐ ☐
15. Is it slight or copious? Slight Co s ☐ ☐
16. How long have you had the discharge? day ☐☐
17. Do you have a burning sensation when you have pass urine? Yes No ☐ ☐
    If "no" skip to 20
    If "yes"
18. How long have you had the burning sensation? days ☐☐
19. Do you have pain in your womb Yes No ☐ ☐
    If "no" skip to 22
    If "yes"
20. How long have you had the womb pain? day ☐☐
21. Do you have pain during sexual intercourse? Yes No ☐ ☐
    If "no" skip to 24
    If "yes"
22. How long have you had pain during sexual intercourse? days ☐☐
23. Do you have swelling in the groin? Yes No ☐ ☐

If "no" skip to 27

If "yes"

24. It is painful? Yes No

25. How long have you had groin swelling? days

26. In the past have you had any of the following?

27a. Vaginal discharge Yes No

27b. Sores on the genital area Yes No

27c. Pain deep down in the lower part of your abdomen Yes No

27d. Vaginal discharge Yes No

27a. Painful swelling in the groin Yes No

A. Examination:

Are any of the following present:

1. Generalized lymphadenopathy Yes No
2. Shin rash Yes No
3. Abdominal tenderness Yes No
4. Abdominal mass Yes No
5. Pelvic tenderness Yes No
6. Inguinal bubo Yes No
7. Genital ulcers Yes No
8. Vesicles on the genitals Yes No Vagina

discharge None Clear Curdy Yellow

10. Foul smelling vaginal discharge Yes No
11. Discharge from the cervix Yes No
12. Ulcers on the cervix Yes No
13. Genital warts Yes No
14. Cervical excitation tenderness Yes No
15. Height of uterine fundus week

Gynaecological diagnosis: .....

Results of tests:

1. Study Number
2. Clinic name .....
3. Clinic number
4. Date specimens received day month year
5. Date report sent out day ye

A. Height of vaginal smear: .....

Candida Pos Ne

Gardnerella Pos Ne

B. Wet mount:

Trichonomas	Pos	Ne	☐	☐

C. Gonococcal culture:

N. gonorrhoeae	Pos	Ne	☐	☐
PPNG stains	Pos	Ne	☐	☐

Isolated stains of N. gonorrhoeae are **sensitive** to the following antibiotics:

.....

Isolated stains of N. gonorrhoeae are **resistant** to the following antibiotics:

.....

D. Haemophilus ducreyi culture:

H. ducreyi culture	Pos	N	☐	☐

Isolated stains of H. ducreyi are **sensitive** to the following antibiotics:

.....

Isolated stains of H. ducreyi are **resistant** to the following antibiotics:

.....

E. Chlamydia antigen test:

Chlamydia ELISA test	Pos	Ne	☐	☐

F. Herpes virus antibody test:

Herpes simplex virus Type I antibody	Pos	N	☐	☐
Herpes simplex virus Type II antibody	Pos	N	☐	☐

G. HIV test:

ELISA I	Pos	N	☐	☐
ELISA	Pos	N	☐	☐

H. Syphilis:

RPR	Pos	Ne	☐	☐
TPHA	Pos	Ne	☐	☐